

CLAIMS

5 1. A sputtering target assembly comprising a high purity copper target, a precipitation hardened aluminum alloy backing plate and an intermediate layer of CuCr diffusion bonded to the target and backing plate.

10 2. A sputtering target assembly according to claim 1 wherein the backing plate is in the fully hard T6 condition.

15 3. A sputtering target assembly according to claim 1 wherein the high purity copper target comprises copper of a purity of at least about 99.999 wt.%.

20 4. A sputtering target assembly according to claim 1 wherein the high purity copper target comprises copper of a purity of at least about 99.995 wt.%.

25 5. A sputtering target assembly according to claim 3 wherein the sputtering target contains a micro-alloy grain stabilizer comprising at least one of Ag, Sn, Te, In, Mg, B, Bi, Sb, and P.

30 6. A sputtering target assembly according to claim 4 wherein said micro-alloy grain stabilizer is present in an amount of about 0.3 ppm to 10 ppm.

35 7. A sputtering target assembly according to claim 5 wherein said micro-alloy grain stabilizer comprises Ag.

8. A sputtering target assembly according to claim 1 wherein said intermediate layer comprises copper and about 0.5 to 1.5 wt.% Cr.

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9. A sputtering target assembly according to claim 1  
wherein the copper target has substantially uniform grain size  
5 comprising not more than about 50  $\mu\text{m}$ .

10. A method of making a sputtering target assembly  
comprising:

a) providing high purity copper target of at  
10 least about 99.999 wt.% purity;

b) preparing a master alloy of copper and not  
more than about 10 ppm of at least one of Ag, Sn, Te, In, Mg, B,  
Bi, Sb, and P;

c) preparing a molten combination of copper and  
master alloy and solidify the molten combination to produce a  
cast billet;

d) hot deforming the cast billet for a total of  
at least about 50% deformation on each axis and then rapidly  
quenching the deformed billet, preferably in water;

e) frictionless forging the quenched billet at  
elevated temperature to about 70% of the starting length of the  
billet and rapidly quenching, preferably in water;

f) cold rolling to a total of about 90%  
deformation;

g) providing an aluminum alloy backing plate  
having a precladding surface of CuCr diffusion bonded thereto;

h) diffusion bonding said high purity copper  
target to the preclad CuCr surface; and

i) precipitation hardening the aluminum alloy  
30 backing plate to the fully hard T6 condition.

11. A method according to claim 9 wherein said master  
alloy is prepared by combining a major amount of high purity  
copper with a minor amount of at least one of Ag, Sn, Ti, In, Mg,

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B, Bi, Sb and P, melting the combination and casting to produce a master alloy.

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12. A method according to claim 10 wherein high purity copper is combined with at least one of Ag, Sn, Ti, In, Mg, B, Bi, Sb and/or P in a ratio of about 1000 to 1.

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13. A method according to claim 9 wherein the aluminum alloy backing plate having a precladding surface of CuCr diffusion bonded thereto is used which is produced by a process comprising embedding an alloy of Cu and Cr in an aluminum or aluminum alloy envelope and e-beam welding the envelope closed in a vacuum environment; heat treating the enclosed envelope and forging to bring the CuCr into intimate contact with the aluminum alloy to be used as a backing plate, quenching removing the aluminum alloy envelope to expose the CuCr surface and precipitation harden the aluminum alloy to full hard T6 condition.

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14. An interconnect for use in an integrated circuit, having a width of about 0.18  $\mu\text{m}$  or less comprising at least 99.999% copper and a micro-alloy stabilizer of at least one of Ag, Sn, Tr, In, Mg, B, Bi, Sb and/or P.

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15. An interconnect for use in an integrated circuit according to claim 13 comprising at least 99.9999% purity.

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16. An interconnect according to claim 14 wherein the amount of micro-alloy stabilizer is about 0.3 to 10 ppm.

17. An interconnect according to claim 15 wherein the amount of micro-alloy stabilizer is about 0.3 to 10 ppm.

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